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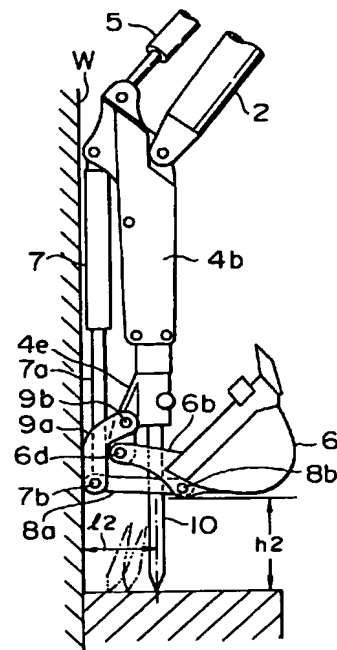
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(54) HYDRAULIC SHOVEL OPERATING MACHINE

(57) A working machine of a hydraulic shovel which enables easy attaching and detaching of a chisel and affords smooth breaker work even in the vicinity of a wall, while enhancing chisel penetration and correspondingly improving the efficiency of the work. To this end, a bucket hinge pin (6d) is provided on one end of each of a pair of bucket brackets (6b) at a position offset from the axis of a breaker-incorporating arm (4b) towards the bucket cylinder (7), and, while the bucket (6) is in the tilted position, the chisel (10) is attached so as to extend through a space between the bucket hinge pins (6d) and bucket link pins (8b) which are provided on the other ends of the bucket brackets (6b).

FIG. 1A



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Description

TECHNICAL FIELD

The present invention relates to a working machine which is used on a hydraulic power shovel and which can mount both an excavating bucket and a breaker chisel.

BACKGROUND ART

Referring to Fig. 8, a conventional hydraulic shovel has a main structure having a lower travelling structure 1a and an upper turret structure 1b, and is equipped with a working machine which is swingably attached to the front side of the main structure 1 and which is composed of various parts such as a boom 2, boom cylinder 3, arm 4, arm cylinder 5, bucket 6, bucket cylinder 7, bucket links 8, intermediate links 9 and so forth. Hydraulic shovels having described constructions are widely used for various purposes including excavation.

In the meantime, currently known are hydraulic shovel working machines of the type in which the arm 4 is substituted by a breaker-incorporating arm which incorporates a breaker mechanism and which detachably carries at its end a chisel for breaking operation (see, for example, Japanese Utility Model Laid-Open No. 4-119847). The procedure for attaching the chisel to the working machine is as follows. The bucket cylinder 7 is operated in contracting direction so that the bucket 6 is moved forward, i.e., to dumping position, through the action of the bucket link 8, intermediate link 9 and the bucket bracket 6a, as shown in Fig. 9. A detachable chisel 10 is attached to the end of the breaker-incorporating arm 4a in this state. According to this arrangement, the apparatus becomes ready for performing breaker work required in rock cutting or pavement breaking, simply by attaching the chisel 10 in a short time. This eliminates laborious work which otherwise may be required for detaching the bucket 6 from the working machine of the hydraulic shovel and then mounting a breaker as an independent attachment, thus reducing man-hour in the replacement work.

The above-described working machine of hydraulic shovel, however, suffers from a problem in that the breaking area is restricted particularly when the breaking work has to be done in the vicinity of a wall without demounting the bucket 6, because the chisel 10 can be attached only when the bucket 6 is in the dumping position. More specifically, referring to Fig. 10, when breaking work is conducted in the vicinity of a wall while keeping the chisel 10 in vertical posture, the bucket cylinder 7 is contracted so as to set the bucket 6 to the dumping position, a wide area is left without being broken, corresponding to the distance l_1 between the chisel 10 and the wall W. In addition, insufficiency of penetration depth is caused because the penetration of the chisel 10 is limited to h_1 . This problem would be overcome by demounting the bucket 6. Such a solution, however, impairs the working

efficiency because the demounting of the bucket 6 is necessary each time the breaking work is to be performed.

DISCLOSURE OF THE INVENTION

The present invention is aimed at obviating the above-described problem of the known arts. Thus, an object of the present invention is to provide a hydraulic shovel working machine which permits easy attaching/detaching of a chisel without requiring a bucket to be demounted from an arm while achieving increased chisel penetration and improved efficiency of work such as breaker work in the vicinity of a wall.

To this end, according to the present invention, there is provided a working machine for use on a hydraulic shovel, comprising: a bucket hinge pin through which one end of each of the bucket brackets is pivotally connected to the breaker-incorporating arm, the bucket hinge pin being offset from the axis of the breaker-incorporating arm towards the bucket cylinder, the chisel being attached so as to extend through a space between the bucket hinge pins and bucket link pins provided on the other ends of the bucket brackets in a state in which the bucket is in tilted position.

The pair of bucket brackets may be spaced a predetermined distance from each other, the chisel being attached so as to extend through a space defined between the bucket hinge pins and the bucket link pins and between the bucket brackets.

An edge of the bucket extending between the pair of bucket brackets may have a notch through which the chisel is extended.

With this arrangement, breaker work is performed while the bucket cylinder is extended to move the bucket towards the main structure and to hold it in the tilted position. In this state, the chisel is attached to the end of the breaker-incorporating arm, through the space between the bucket hinge pins and the bucket link pins. Since the chisel is attached under such a condition that the bucket is in the tilted position, breaker work in the vicinity of a wall can be executed without causing interference between the wall and the bucket, so that the chisel can approach the wall to perform breaking work in close proximity of the wall, thus achieving higher efficiency of the work. Furthermore, chisel penetration can be increased as compared with the conventional apparatuses, because the distance between the pavement surface and the bottom of the bucket or bucket brackets can be increased by setting the bucket in the tilted position, whereby the working machine can be adapted to a wider scope of work. The same advantages can be enjoyed also when the chisel is driven through the predetermined spacing between the pair of bucket brackets. When the breaker work is finished, the chisel is demounted from the breaker-incorporating arm, so that the working machine becomes ready for ordinary excavating work. Notching at the bucket edge enables the lengths of the bucket bracket and bucket link to be reduced almost to the same lengths as those in conventional apparatuses,

so that the excavating operation can be performed almost in the same sense as that in conventional apparatuses.

BRIEF DESCRIPTION OF THE DRAWINGS

Figs. 1A and 1B are illustrations of a critical portion of a first embodiment of the hydraulic shovel working machine in a state in which a bucket is tilted to allow attaching of a chisel, wherein Fig. 1A is a side elevational view, while Fig. 1B is a bottom plan view; Fig. 2 is a side elevational view of the critical portion of the working machine, illustrative of the manner in which the chisel is detached while the bucket is in the tilted position; Fig. 3 is a view as viewed in the direction of the arrow Y in Fig. 2; Figs. 4A, 4B and 4C are views as viewed in the direction of the arrow Z in Fig. 3, illustrative of the method for locking and unlocking the chisel, wherein Fig. 4A is an illustration of a tool, Fig. 4B is an illustration of the chisel in unlocked state, and Fig. 4C is an illustration of the chisel in locked state; Fig. 5 is a sectional view corresponding to the A-A sectional plane of Fig. 2, with the chisel attached and locked; Fig. 6A is a sectional view corresponding to the A-A sectional plane of Fig. 2, with the chisel detached; Fig. 6B is a side elevational view of a dummy cap to be inserted into a sleeve shown in Fig. 6A; Figs. 7A and 7B are illustrations of a critical portion of a second embodiment of the hydraulic shovel working machine in a state in which a bucket is tilted to allow attaching of a chisel, wherein Fig. 7A is a side elevational view, while Fig. 7B is a bottom plan view; Fig. 8 is a side elevational view of a conventional hydraulic shovel apparatus; Fig. 9 is side elevational view of a conventional hydraulic shovel apparatus with a chisel attached thereto; and Fig. 10 is a side elevational view of a critical portion of a working machine on the hydraulic shovel apparatus of Fig. 9 under breaker work.

THE BEST MODE FOR CARRYING OUT THE INVENTION

Preferred embodiments of the hydraulic shovel working machine in accordance with the present invention will be described with reference to the accompanying drawings.

Referring to Figs. 1A and 1B which show a first embodiment of the hydraulic shovel working machine, an ordinary link mechanism is used to interconnect a front cap 4e on the end of a breaker-incorporating arm 4b pivoted to the end of a boom 2, an end of a piston rod 7a of a bucket cylinder 7 and a pair of bucket brackets 6b which protrude from the rear face of the bucket 6. More specifically, the bucket brackets 6b are pivotally secured to an end of the front cap 4e through bucket hinge pins 6d. There are a pair of intermediate links 9a. Each of a pair of intermediate links 9a is pivotally connected at its one end to the front cap 4e through an intermediate link pin 9b and at its other end to the end of the piston rod 7a through a bucket cylinder top pin 7b. Each of a pair of

bucket links 8a is pivotally connected at its one end to the end of the piston rod 7a through the above-mentioned bucket cylinder top pin 7b. The other end of the bucket link 8a is swingably connected to corresponding bucket bracket 6b through a bucket link pin 8b.

The bucket brackets 6b, bucket links 8a and the intermediate links 9a are basically the same as those in the known arts but are distinguished by shapes, dimensions and so forth. To explain in more detail, the shapes and dimensions of the bucket brackets and other components in this embodiment are so determined as to allow a later-mentioned chisel 10 to be attached to the end of the front cap 4e of a breaker-incorporating arm 4b through the space defined between each pair of components such as the bucket brackets 6b, when a bucket 6 is in the tilted position. More specifically, since the bucket hinge pins 6d are offset from the axis of the breaker-incorporating arm 4b towards the bucket cylinder 7, the bucket brackets 6b are so shaped as to extend upward at the rear side of the bucket 6. The spacing between the pair of bucket brackets 6b substantially parallel to each other is determined to be at least greater than the outside diameter of the chisel 10. The positions of the offset bucket hinge pins 6d and the bucket link pins 8b are so determined that the chisel can be moved through the space therebetween without interference when the bucket is in the tilted position. For the same reason, the bucket link 8a is designed to have a length greater than that in the conventional apparatus and the shape and other factors of the intermediate link 9a are determined correspondingly.

According to this arrangement, change-over from ordinary excavating operation using the bucket 6 to a breaker work is accomplished as follows. The bucket cylinder 7 is extended to move the bucket 6 to the tilted position and to hold the same at this position. In this state, the chisel 10 is moved through the spacing between the pair of bucket links 8a and is attached to the end of the front cap 4e of the breaker-incorporating arm 4b. It is thus possible to execute the breaker work without demounting the tilted bucket 6.

It is assumed here that the breaker work is conducted at a position near a wall, with the chisel 10 held in vertical (up and down direction) position as shown in Fig. 1A. In this case, the distance ℓ_2 between the chisel 10 and the wall W is much smaller than the distance ℓ_1 (see Fig. 10) in the known arts. At the same time, the heightwise distance h2 between the lower end of the bucket 6 or the bucket link 8a and the road surface such as a concrete-paved surface is much greater than that h1 (see Fig. 10) of the known arts, whereby the chisel penetration depth can be increased. When the breaking is required to reach a region in the close proximity of the wall, the working machine is so controlled as to slightly incline the breaker-incorporating arm 4b so that the breaker work can be done with the chisel positioned as shown by phantom lines in Fig. 1A. These advantages enhance the efficiency of the breaker work conducted in the area near a wall. The hydraulic shovel apparatus

becomes ready for ordinary excavating operation, simply by removal of the chisel 10 (see Fig. 2).

A description will now be given as to the method of attaching and detaching the chisel 10 to and from the breaker-incorporating arm 4b. Referring first to the attaching method, the chisel 10 is inserted into a bore formed in the end of the breaker-incorporating arm 4b as shown in Figs. 3, 4A and 4B. In this state, a pin portion 12a of a pin 12 is inserted into a pin-receiving bore 11a of a lock pin 11, and the tool 12 is rotated in the direction of the arrow A to the position shown in Fig. 4C. The tool 12 is then withdrawn. In this state, the outer surface of the lock pin 11 contacts the surfaces of sleeves 4c, 4d provided in the breaker-incorporating arm 4b and the bottom of a recess 10a formed in the chisel 10, so that the chisel 10 is locked on the breaker-incorporating arm 4b. The breaker work is possible with this locked chisel.

In order to conduct ordinary excavating operation, the chisel is detached by taking procedure reverse to that described above. Namely, the tool 12 is inserted into the pin-receiving bore 11a and is rotated in the direction of the arrow B as shown in Figs. 4C and 4B, whereby the chisel is unlocked. In this unlocking state, a notched surface 11b of the lock pin 11 faces inward as shown in Fig. 6A, so that the chisel 10 can easily be detached from the breaker-incorporating arm 4b without difficulty. It is thus possible to attach and detach the chisel quickly and easily. After the detaching of the chisel 10, a dummy cap 13 having a recess 13a as shown in Fig. 6B is inserted into the sleeves 4c, 4d and is locked in the same way as that for the chisel 10, thereby preventing soil and sand from coming into the sleeves 4c, 4d.

A second embodiment of the hydraulic shovel working machine of the present invention will be described with reference to Figs. 7A and 7B. The basic construction of the second embodiment is similar to that of the first embodiment, so that the following description will be focused only on the points which discriminate the second embodiment. In this embodiment, an edge of the bucket 6 is notched as at 6c over a region substantially corresponding to the spacing between the pair of brackets 6b. The notch 6c is intended to prevent interference between the bucket 6 and the chisel 10 which otherwise may occur when the bucket 6 is held at the tilted position during attaching of the chisel 10 or during breaker work. The notch 6c enables the bucket 6 to be mounted closer to the chisel 10 than in the first embodiment, so that the lengths of the bucket brackets and bucket links can be reduced as compared with those in the first embodiment. Thus, the second embodiment offers breaking performance equivalent to that of the first embodiment and can perform excavating operation with the same sense of control as that for the conventional working machine.

Although the hydraulic shovel working machine in accordance with the invention has been described in detail, it is to be understood that the chisel can be attached while the bucket is in the dump position. Thus, the chisel can be attached either in a state in which the bucket is in the dumping position or in a state in which

the bucket is in the tilted position, and one of these states can be selected as necessary so as to enable the working machine to easily clear any obstacle.

5 INDUSTRIAL APPLICABILITY

The hydraulic shovel working machine of the present invention enables easy attaching and detaching of a chisel both when the bucket is in the tilted position and when the same is in the dump position. The working machine also enables breaker work to be conducted in the close proximity of a wall, while enhancing the chisel penetration and, hence, breaker work efficiency.

15 Claims

1. A working machine for use on a hydraulic shovel of the type having a breaker-incorporating arm pivotally connected to an end of a boom, a bucket pivotally attached to an end of said breaker-incorporating arm through a pair of bucket brackets, and a chisel detachably attached to the end of said breaker-incorporating arm, said working machine comprising: a bucket hinge pin through which one end of each of said bucket brackets is pivotally connected to said breaker-incorporating arm, said bucket hinge pin being offset from the axis of said breaker-incorporating arm towards said bucket cylinder, said chisel being attached so as to extend through a space between said bucket hinge pins and bucket link pins provided on the other ends of said bucket brackets in a state in which said bucket is in tilted position.
2. A working machine for use on a hydraulic shovel as set forth in Claim 1, wherein said pair of bucket brackets are spaced a predetermined distance from each other, said chisel being attached so as to extend through a space defined between said bucket hinge pins and said bucket link pins and between said bucket brackets.
3. A working machine for use on a hydraulic shovel as set forth in Claim 1 or 2, wherein an edge of said bucket extending between said pair of bucket brackets has a notch through which said chisel is extended.

FIG. 1A

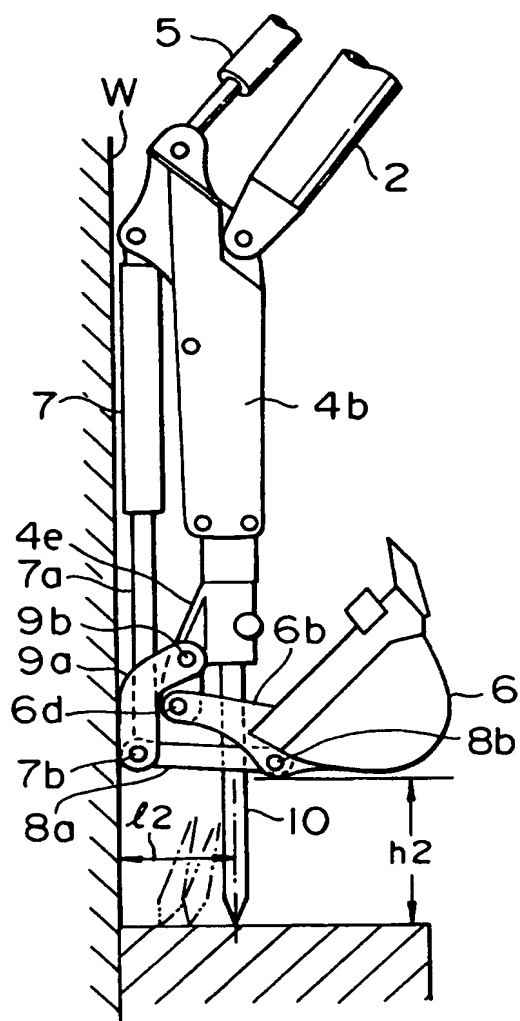


FIG. 1B

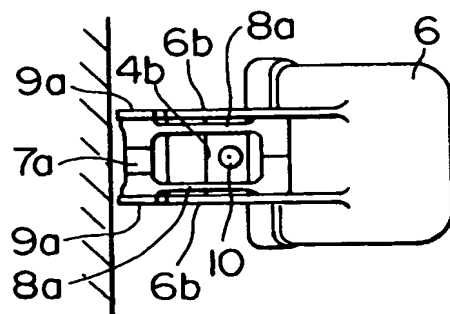


FIG. 2

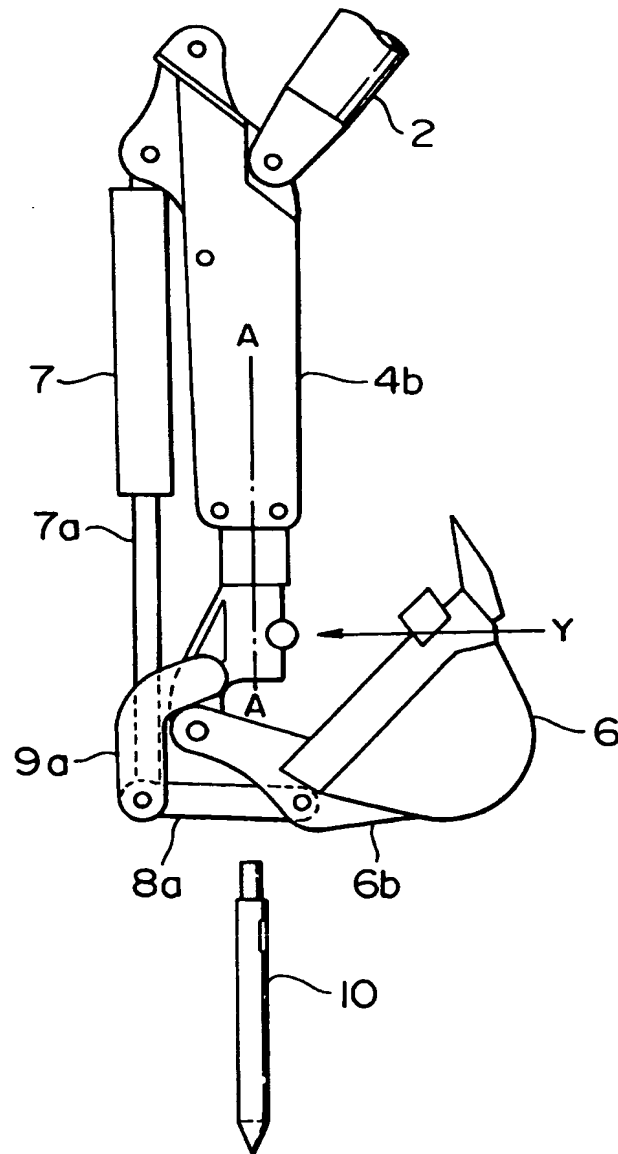


FIG. 3

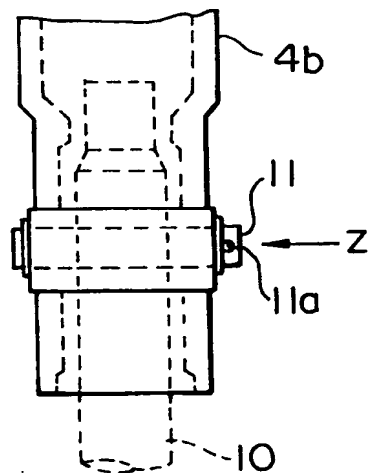


FIG. 4A

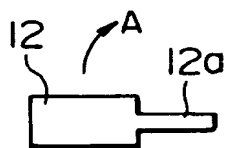


FIG. 4B

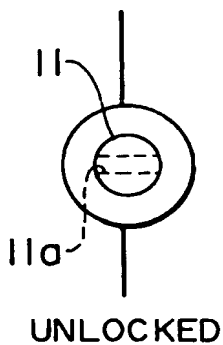


FIG. 4C

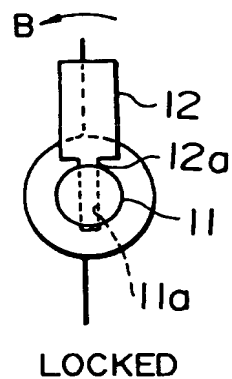


FIG. 5

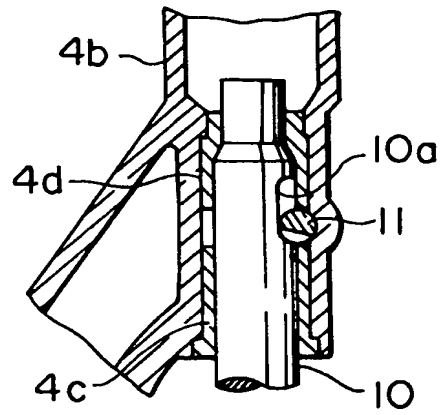


FIG. 6A

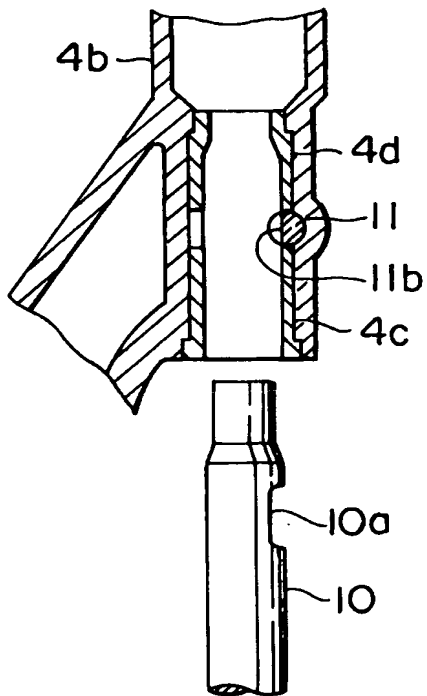


FIG. 6B

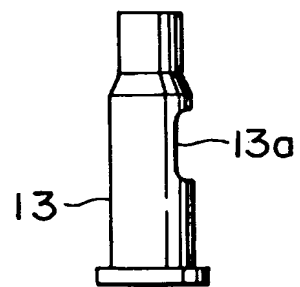


FIG. 7A

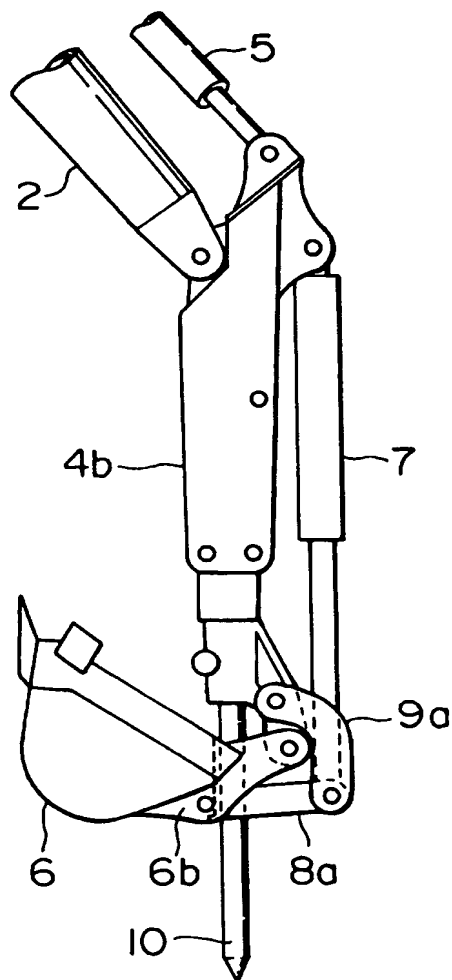


FIG. 7B

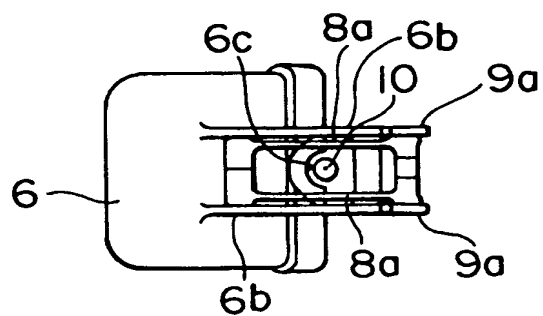


FIG. 8
PRIOR ART

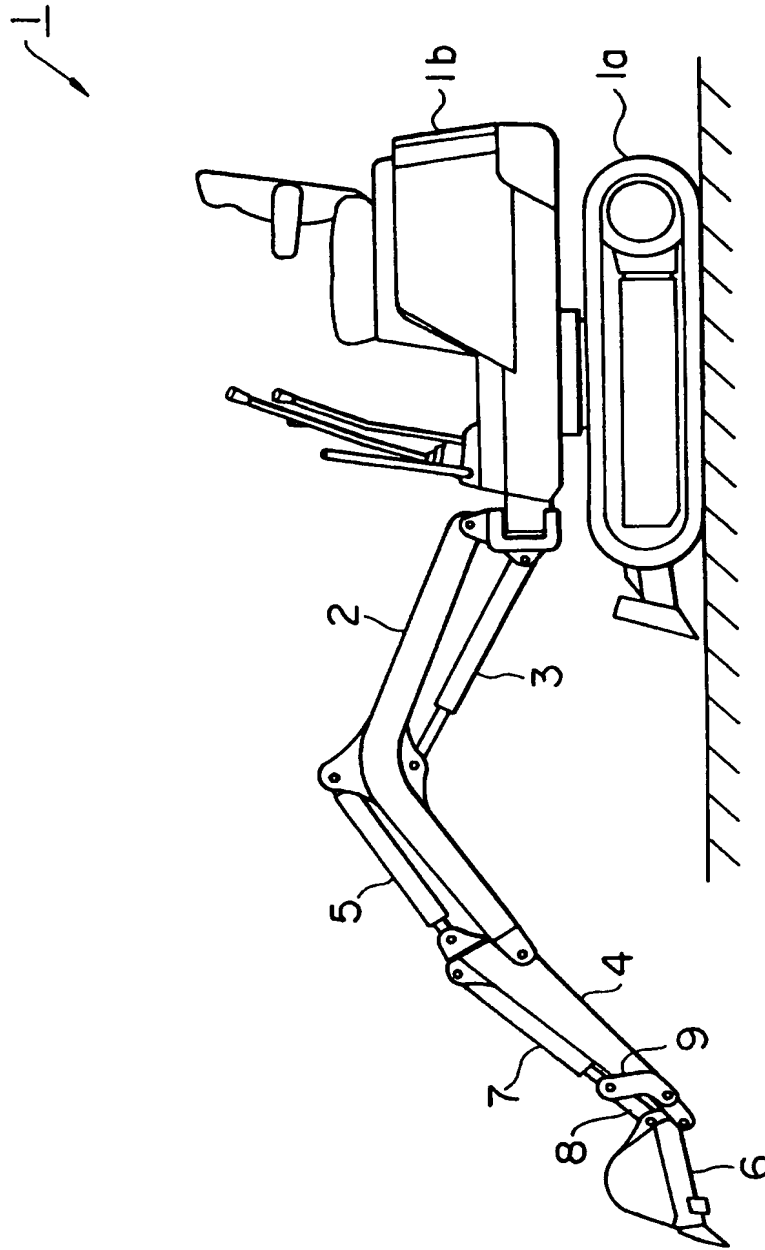


FIG. 9
PRIOR ART

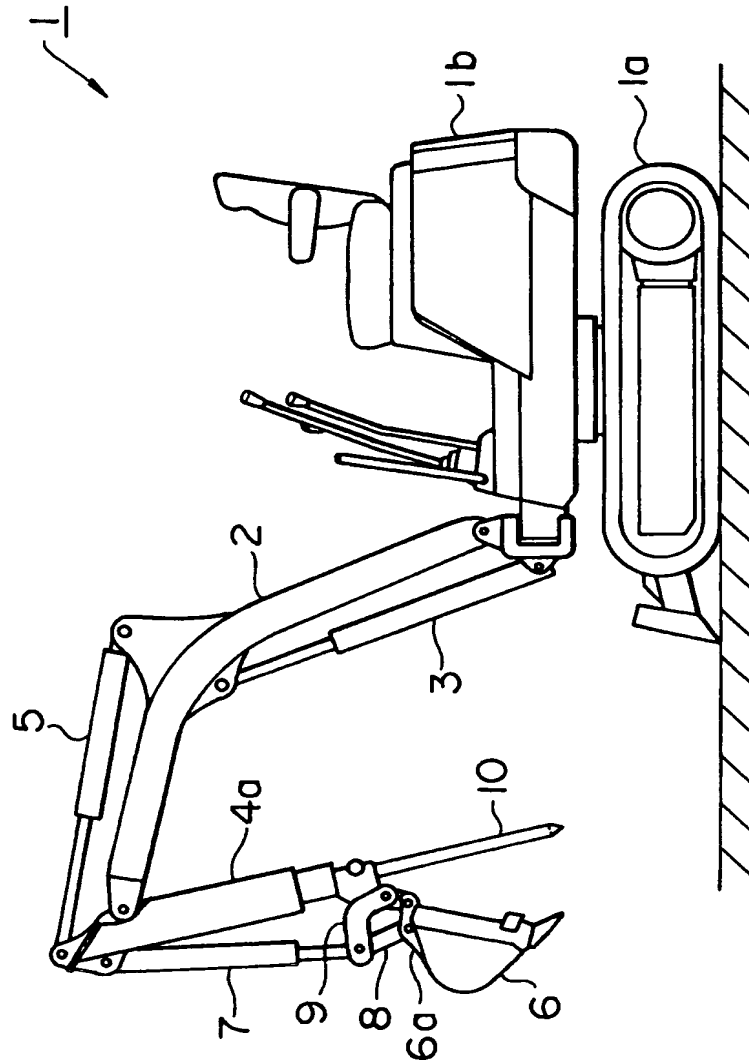
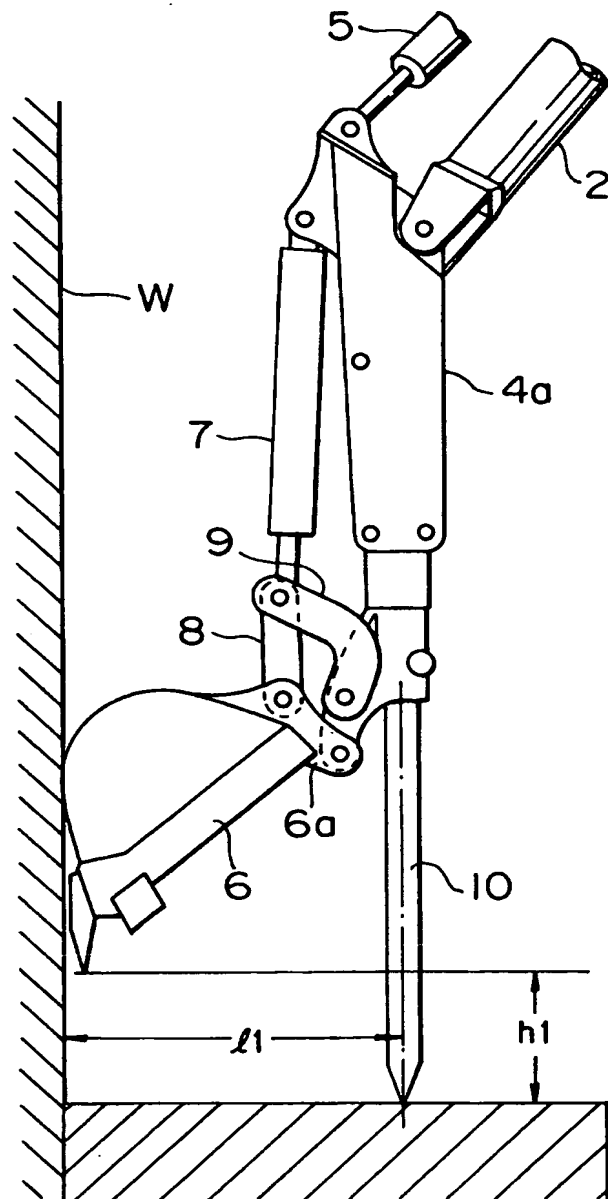


FIG. 10
PRIOR ART



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP94/01408

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl⁶ E02F3/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int. Cl⁶ E02F3/38, E02F3/96

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho 1957 - 1994

Kokai Jitsuyo Shinan Koho 1973 - 1994

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	JP, U, 4-119847 (Komatsu Ltd., Komatsu Zenoa Co., Ltd.), October 27, 1992 (27. 10. 92), Lines 6 to 7, column 1, Figs. 2 to 3, (Family: none)	1-2 3
Y	JP, A, 51-7708 (Hitachi Construction Machinery Co., Ltd.), January 22, 1976 (22. 01. 76), Lines 10 to 14, upper right column, page 2, Fig. 4	1
Y A	Fig. 3, (Family: none)	2 3

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Date of the actual completion of the international search

November 1, 1994 (01. 11. 94)

Date of mailing of the international search report

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